MOTOROLA
SEMICONDUCTORS
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MC34151
MC33151

Product Preview

HIGH SPEED DUAL MOSFET DRIVER

The MC34151, MC33151 is a dual inverting monolithic high speed driver specifically designed for applications that require low current digital circuitry to drive large capacitive loads with high slew rates. This device features low input current making it CMOS and LSTTL logic compatible, input hysteresis for fast output switching that is independent of input transition time, and two high current totem pole outputs ideally suited for driving power MOSFETs. Also included is an undervoltage lockout with hysteresis to prevent erratic system operation at low supply voltages.

Typical applications include switching power supplies, DC to DC converters, capacitor charge pump voltage doublers/inverters, and motor controllers.

These devices are available in dual-in-line and surface mount packages.

- Two Independent Channels with 1.5A Totem Pole Outputs
- Output Rise and Fall Times of 15nS with 1000pf Load
- CMOS/LSTTL Compatible Inputs with Hysteresis
- Undervoltage Lockout with Hysteresis
- Low Standby Current
- Efficient High Frequency Operation
- Enhanced System Performance with Common Switching Regulator Control ICs
- Pin Out Equivalent to DS0026 and MMH0026

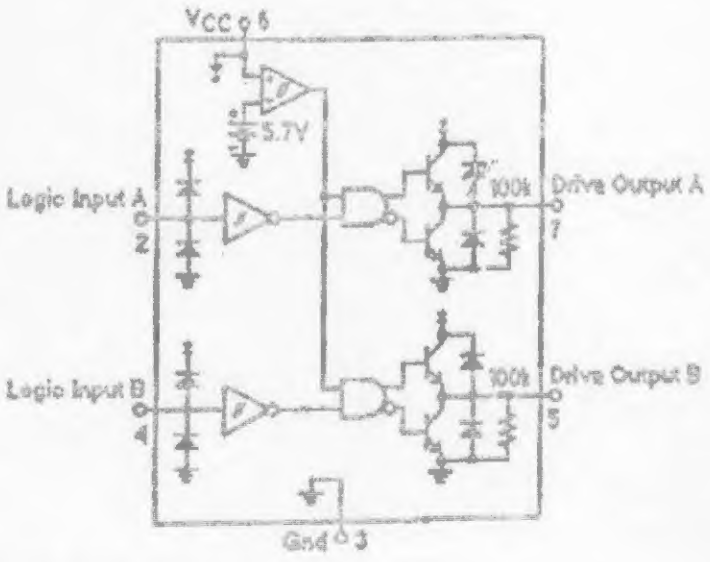
HIGH SPEED DUAL MOSFET DRIVER

SILICON MONOLITHIC INTEGRATED CIRCUIT

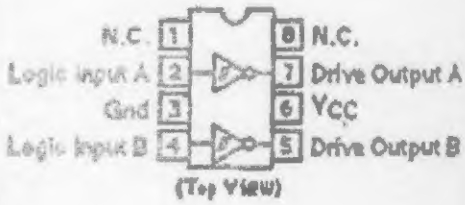
P SUFFIX
PLASTIC PACKAGE
CASE 626-05

D SUFFIX
PLASTIC PACKAGE
CASE 751-02
SO-8

BLOCK DIAGRAM



PIN CONNECTIONS



ORDERING INFORMATION

Device	Temperature Range	Package
MC34151D	0 to + 70°C	SO-8 Plastic DIP
MC34151P	0 to + 70°C	Plastic DIP
MC33151D	-40 to + 85°C	SO-8 Plastic DIP
MC33151P	-40 to + 85°C	Plastic DIP

MAXIMUM RATING

Rating	Symbol	Value	Unit
Power Supply Voltage	V_{CC}	20	V
Logic Inputs	V_{in}	-0.3 to V_{CC}	V
Drive Outputs (Note 1)			A
Totem Pole Sink or Source Current	I_O	1.5	
Upper and Lower Clamp Diode Foward Current	I_F	1.0	
Power Dissipation and Thermal Characteristics			
D Suffix Package SO-8 Case 751-02			
Maximum Power Dissipation @ T_A = 50°C	P_D	0.56	W
Thermal Resistance Junction to Air	$R_{\theta JA}$	180	°C/W
P Suffix 8-Pin Package Case 626-05			
Maximum Power Dissipation @ T_A = 50°C	P_D	1.0	W
Thermal Resistance Junction to Air	$R_{\theta JA}$	100	°C/W
Operating Junction Temperature	T_J	+150	°C
Operating Ambient Temperature	T_A		°C
MC34151		0 to +70	
MC33151		-40 to +85	
Storage Temperature Range	T_{stg}	-65 to +150	°C

ELECTRICAL CHARACTERISTICS (V_{CC} = 12 V, For typical values T_A = 25 °C, for min/max values T_A is the operating ambient temperature range that applies [Note 2] unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
LOGIC INPUTS					
Input Threshold Voltage					V
High State Logic 1	V_{IH}	2.6	—	—	
Low State Logic 0	V_{IL}	—	—	0.8	
Hysteresis	V_H	0.04	—	0.4	
Input Current					mA
High State (V_{IH} = 2.6 V)	I_{IH}	—	—	1.0	
Low State (V_{IL} = 0.8 V)	I_{IL}	—	—	0.1	
DRIVE OUTPUT					
Output Voltage					V
Low State (I Sink = 10 mA)	V_{OL}	—	0.9	1.2	
(I Sink = 50 mA)		—	1.1	2.0	
(I Sink = 400 mA)		—	1.5	2.5	
High State (I Source = 10 mA)	V_{OH}	10.3	11.2	—	
(I Source = 50 mA)		10.0	11.1	—	
(I Source = 400 mA)		9.5	10.8	—	
Output Pull-Down Resistor	R_{PD}	—	100	—	kΩ

Notes:

1. Maximum package power dissipation limits must be observed.
2. Low duty cycle pulse techniques are used during test to maintain the junction temperature as close to ambient as possible.

T_{low} = 0°C for MC34151
= -40°C for MC33151

T_{high} = 70°C for MC34151
= 85°C for MC33151

ELECTRICAL CHARACTERISTICS (V_{CC} = 12 V, For typical values T_A = 25 °C, for min/max values T_A is the operating ambient temperature range that applies [Note 2] unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS (T_A = 25°C)					
Propagation Delay (10% Input to 10% Output, C_L = 1.0 nF)					nS
Logic Input to Drive Output Rise	$t_{PLH(IN/OUT)}$	—	50	100	
Logic Input to Drive Output Fall	$t_{PHL(IN/OUT)}$	—	45	100	
Drive Output Rise Time (10% to 90%)	t_r				nS
C_L = 15 pF		—	9	—	
C_L = 1.0 nF		—	14	30	
C_L = 2.5 nF		—	26	50	
Drive Output Fall Time (90% to 10%)	t_f				nS
C_L = 15 pF		—	11	—	
C_L = 1.0 nF		—	16	30	
C_L = 2.5 nF		—	28	50	
TOTAL DEVICE					
Power Supply Current	I_{CC}				mA
Standby (Logic Inputs Grounded)		—	6.0	10	
Operating (C_L = 1.0 nF Drive Outputs 1 and 2, f = 100 kHz)		—	10.5	15	
Operating Voltage	V_{CC}	6.0	—	18	V

FIGURE 1 - SWITCHING CHARACTERISTICS TEST CIRCUIT

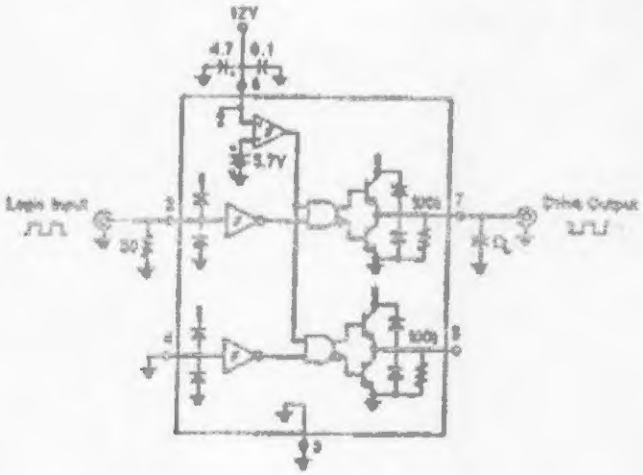


FIGURE 2 - SWITCHING WAVEFORM DEFINITIONS

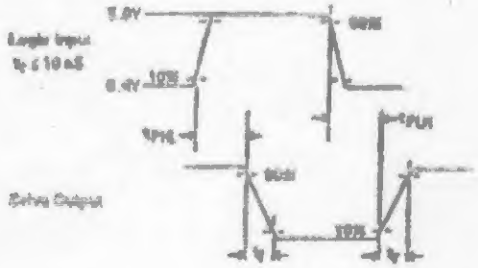


FIGURE 3 - ENHANCED SYSTEM PERFORMANCE WITH COMMON SWITCHING REGULATORS

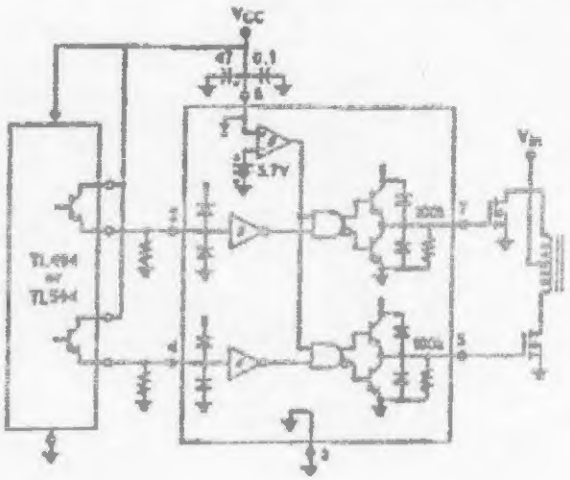


FIGURE 4 - MOSFET PARASITIC OSCILLATIONS

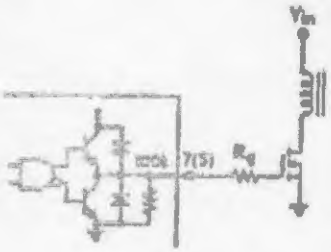


FIGURE 5 - DIRECT TRANSFORMER DRIVE

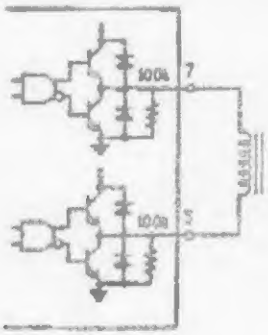
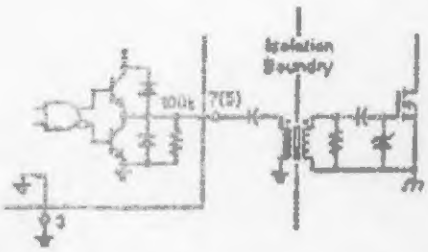
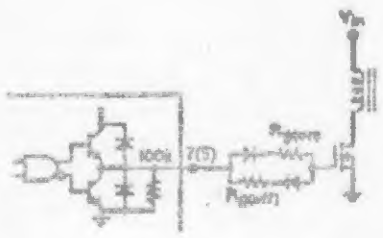


FIGURE 6 - ISOLATED MOSFET DRIVE



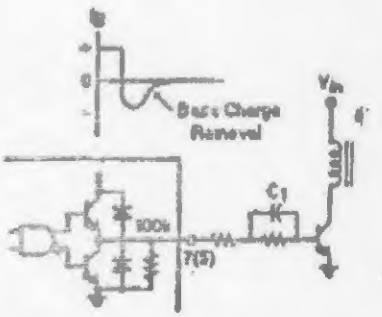
Series gate resistor (R_g) may be needed to damp high frequency parasitic oscillations caused by the MOSFET input capacitance and any parasitic wiring inductance in the gate-source circuit. R_g will decrease the MOSFET switching speed.

FIGURE 7 - CONTROLLED MOSFET DRIVE



In noise sensitive applications, both conducted and radiated EMI can be reduced significantly by controlling the MOSFET's turn-on and turn-off time.

FIGURE 8 - BIPOLAR TRANSISTOR DRIVE



This totem-pole output can furnish negative base current for enhanced transistor turnoff, with the addition of C1.